

FIG. 1

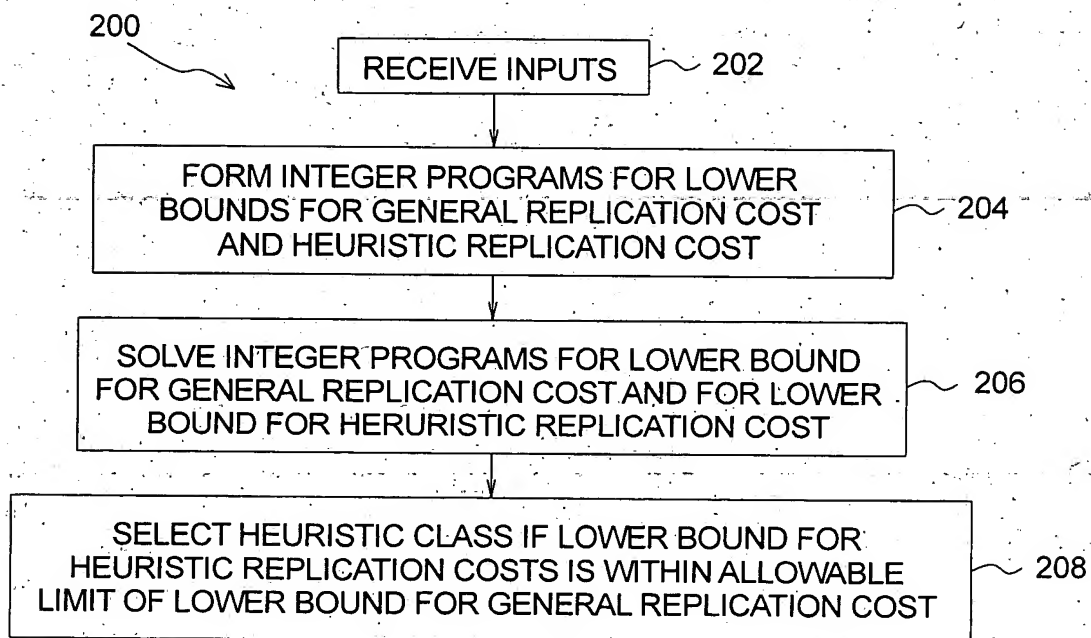


FIG. 2

| Table 1 | | |
|-----------------|--------|---|
| Variable | Type | Description |
| $store_{nik}$ | Binary | n th node stores k th data object during i th interval |
| $create_{nik}$ | Binary | k th data object created on n th node during i th interval |
| $covered_{nik}$ | Binary | n th node can access k th data object w/in latency threshold during i th interval |
| $open_n$ | Binary | n th node is enabled; it can store replicas and run data placement heuristics |

FIG. 3

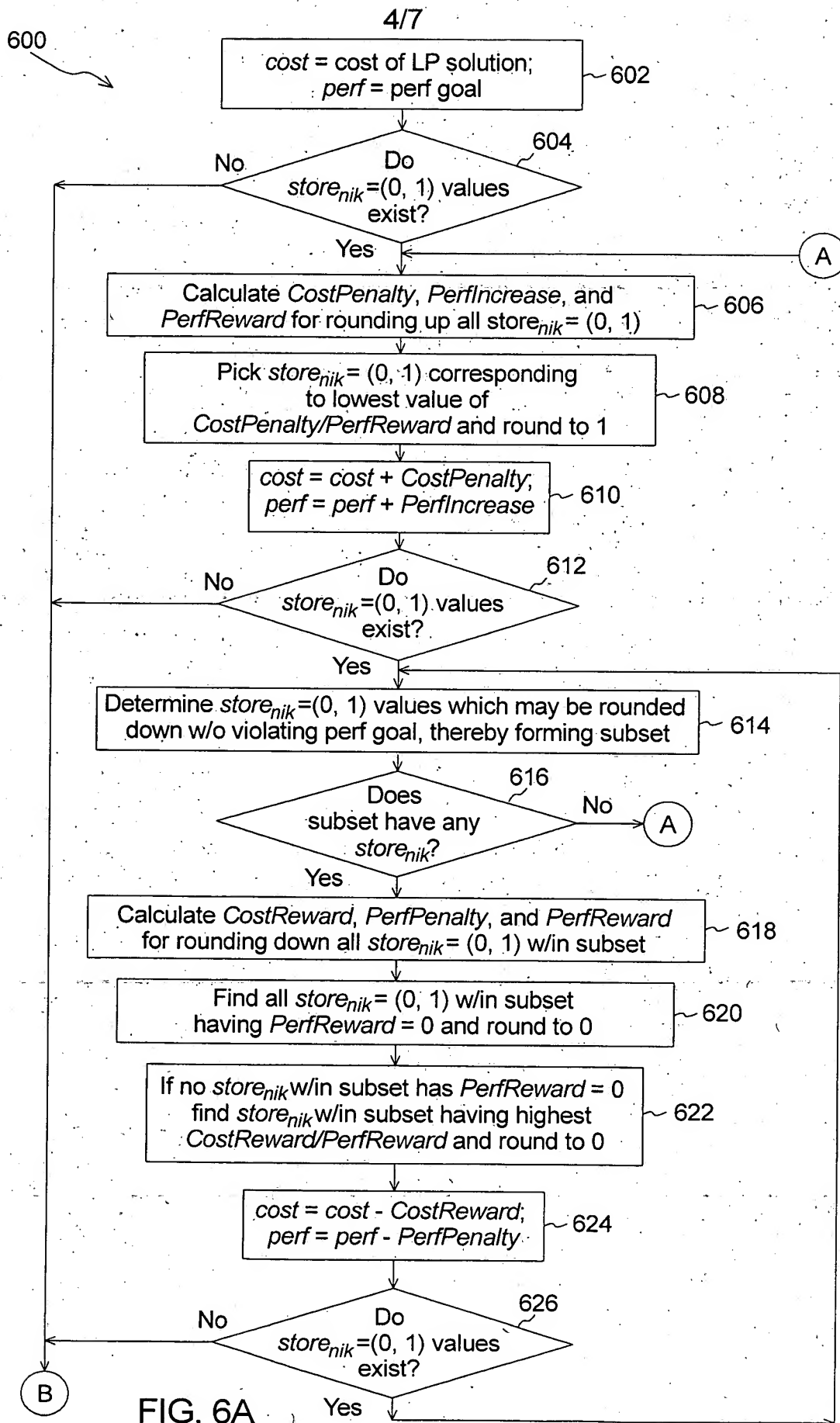
| Table 2 | | |
|----------------|---------|---|
| Variable | Type | Description |
| $read_{nik}$ | Integer | Number of read requests from n th node for k th data object during i th interval |
| $write_{nik}$ | Integer | Number of write requests from n th node for k th data object during i th interval |
| $latency_{nm}$ | Real | Data access latency for accessing an object a th m th node from n th node |
| $dist_{nm}$ | Binary | n th node can access m th node within latency threshold |
| $know_{nm}$ | Binary | n th node uses information from m th node to make placement decision |
| $fetch_{nm}$ | Binary | n th node can fetch data objects form m th node |
| $hist_{nik}$ | Binary | n th node has a record in its activity history of k th data object being accessed on n th node during i th interval |
| T_{lat} | Real | Target latency threshold |
| T_{qos} | Real | Specified ratio of accesses served within latency threshold |
| α | Integer | Unit cost for storage |
| β | Integer | Unit cost for replica creation |
| γ | Integer | Unit cost penalty for an access exceeding latency threshold |
| δ | Integer | Unit cost for an update message |
| ζ | Integer | Unit cost for enabling and managing a node |

FIG. 4

Table 3

| Heuristic class | Heuristic properties | | | | | |
|---|----------------------|--------------------|--------|--------|--------|---------------------|
| | Storage constraint | Replica constraint | route | know | hist | Reactive constraint |
| Storage constrained heuristics | x | | global | global | multi | |
| Replica constrained heuristics | | x | global | global | multi | |
| Decentralized storage constrained heuristics w/ local routing | x | | local | local | multi | |
| Local caching | x | | local | local | single | x |
| Cooperative caching | x | | global | global | single | x |
| Local caching w/ prefetching | x | | local | local | single | |
| Cooperative caching w/ prefetching | x | | global | global | single | |

FIG. 5



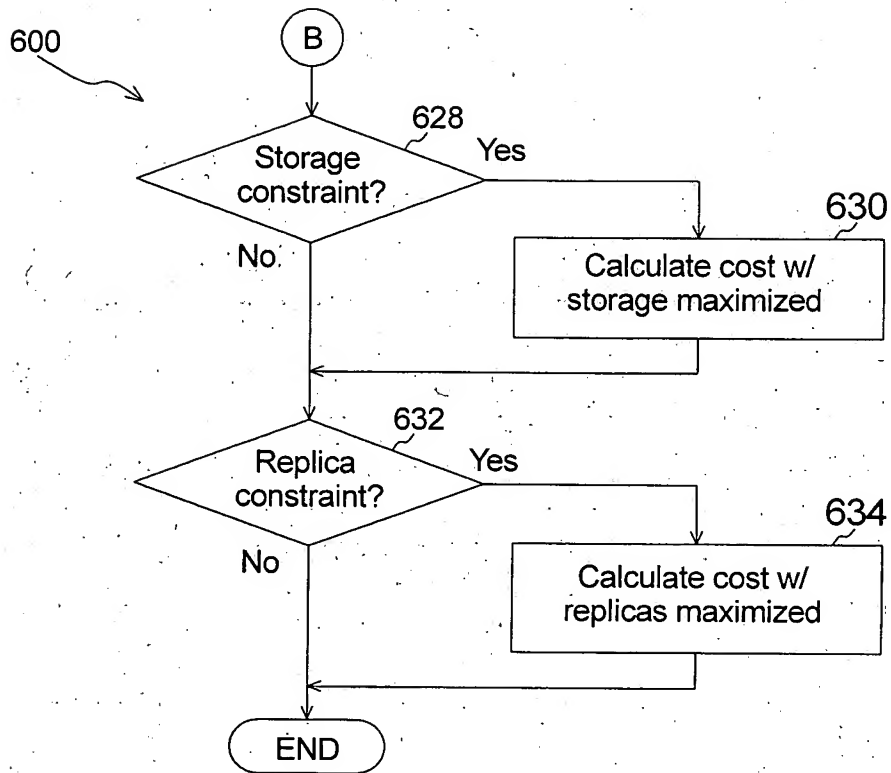


FIG. 6B

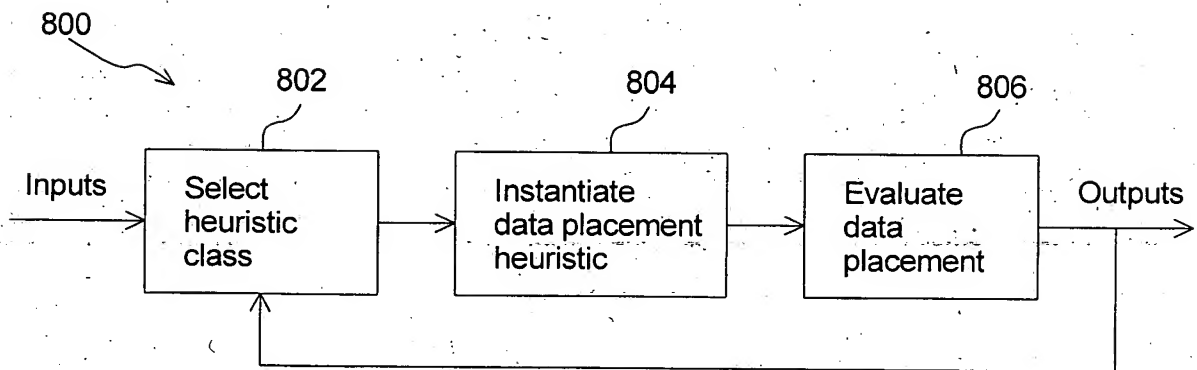


FIG. 8

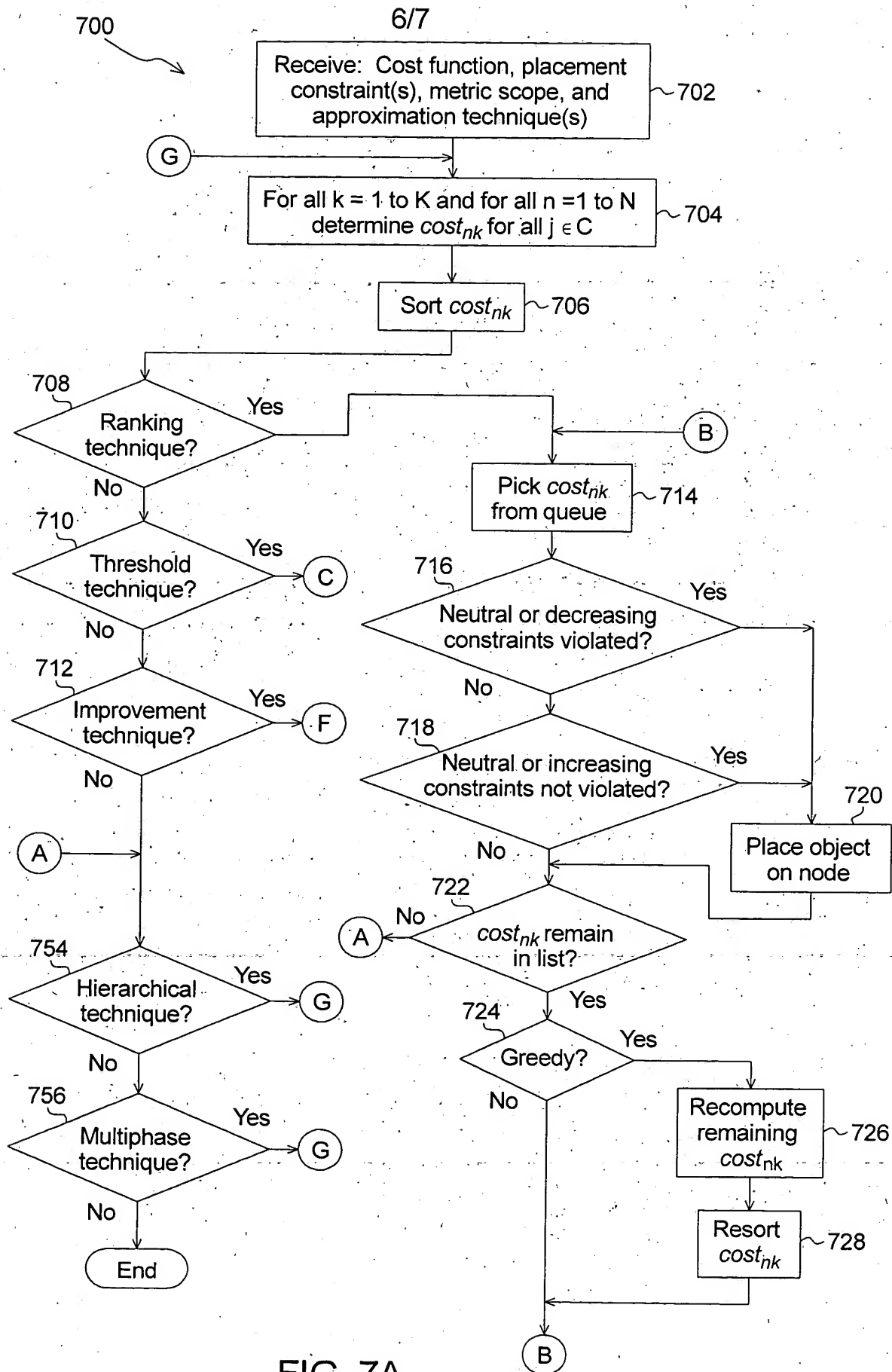


FIG. 7A

